one to the other within a gaseous shell surrounding both. Finally the two papers of the sixth group discuss the physical processes that may cause the observed aberrancies of these stars.

The material presented in these papers constitutes the first summarized gleanings in a field of astrophysics that is bound to enlarge. One wonders what a book on the same subject will have to offer, say, ten years from now? Will the resources of our large observatories, personal as well as instrumental, be adequate to follow the momentary and occasional capricious behavior of stars for which no underlying causes are as yet apparent?

Physikalisches Taschenbuch (2nd Revised Edition). By Hermann Ebert. 544 pp. Vieweg & Sohn, 1957. DM 22.80. **Technische Kunstgriffe bei physikalischen Untersuchungen** (11th Revised Edition). By E. v. Angerer. Revised by H. Ebert. 369 pp. Friedr. Vieweg & Sohn, Braunschweig, Germany, 1957. DM 18.80. *Reviewed by L. Marton, National Bureau of Standards.*

It seems logical to review the two books listed above together, for they both have been edited by Hermann Ebert and cover closely related subjects. Both books are new editions of earlier books; one of them is now in its eleventh edition. I have translated the description of the edition on the title page somewhat freely in both cases as "revised edition". Actually, I am misleading the reader, because while the title page of the first book says "third improved and extended edition", the eleventh edition of *Technische Kunstgriffe* merely says "eleventh inspected edition" (durchgesehene Auflage). Both books are well known to many American scientists who were either studying in Germany or getting closely acquainted with the German literature. This applies particularly to v. Angerer's book which is a classic of its own much in the manner of Strong's manual in America.

The *Physikalisches Taschenbuch* is the same type of production as the *American Institute of Physics Handbook*. Its total volume is roughly one third of that of the *AIP Handbook,* and its emphasis is a trifle more on experimental data than that of the *Handbook*. Personally, I am somewhat surprised by the renewed tendency of publishing handbooks of this type, because more often than not when I try to look up some data which I sadly need, just *the* data are missing in the handbook. This may be the fault of the book, or of my special interests. For instance, the other day I needed to know the dielectric strength of mica. I could find the value in neither the *AIP Handbook* nor in Ebert's new *Physikalisches Taschenbuch.* On the other hand, it is indisputable that there is much valuable material collected in this small volume and for those who learn to use it, it may stay, because of its size, a somewhat more useful compendium than the *AIP Handbook*. The editors pride themselves that the volume goes into the pocket of any "Physiker", and that claim the *AIP Handbook* can't make, unless special pockets are provided for "Physikers".

The *Technische Kunstgriffe bei physikalischen Untersuchungen* of the late v. Angerer has been reworked by Dr. Ebert with the help of numerous collaborators. It is a very good book of its kind with many recipes of laboratory practices and makes a serious effort toward including material from outside Germany. Nevertheless, any user in this country will have to make a slight adjustment because when it comes, for instance, to a list of suppliers for such materials, 97% are German and only 3% are foreign. Often enough the English expression for a given German word is given in the footnote. The purpose is apparently to acquaint the German reader with the English language literature but the opposite is equally true and this may be a good book to use for a physics major's German examination, or as supplementary reading for a course in technical German. On the whole this is a very nice book and many a physicist will enjoy browsing in it from time to time.

Vector Analysis. By Louis Brand. 282 pp. John Wiley & Sons, Inc., New York, 1957. $6.00. *Reviewed by Paul Slepian, Hughes Research Laboratories.*

The organization of this book, *Vector Analysis,* is excellent. Although nominally divided into nine chapters, the book naturally partitions itself into three sections. This grouping consists of Chapters 1–5, Chapters 6–8, and Chapter 9.

In Chapters 1–5 the standard mathematical treatment of vector analysis is presented. Chapter 1 deals with the basic fundamentals of vector algebra which are now included in most modern calculus textbooks. At the end of the chapter is a useful collection of the main formulas of vector algebra.

Chapter 2, the shortest in the book, could have been omitted with no loss. It deals with line vectors, couples, motors, and their applications to statics. Professor Brand states in the preface to his earlier book, *Vector and Tensor Analysis,* published in 1947, that the motor is apparently destined to play an important role in mechanics and line geometry. This predilection of his for motors is the only reason this reviewer can find for the inclusion of this chapter.

Chapters 3 and 4 deal with curves, surfaces, and the accompanying elementary results of classical differential geometry. In Chapter 5 the gradient of a vector is introduced followed by the definition of a dyadic; this leads to a greater generality in discussing divergence and rotation, which is preserved throughout the book. As explained in the preface, the author believes that this is not only the proper procedure, but actually the simplest in the long run. Many people may question both of these statements, but the use of dyadics is held to a reasonable minimum, and the exposition is usually suitably clear.

In Chapter 5 the standard integration formulas of Stokes and Green are developed together with their ex-

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tensive variations. The chapter concludes with an excellent summary in which it is shown that the many vector integration formulas are all special cases of three basic tensor integral transformations.

Having developed the elaborate machinery in Chapters 1–5 the author devotes the next three chapters to three applications of these established results, namely, dynamics, fluid mechanics, and electrodynamics. The five earlier chapters are so carefully planned, and the results so excellently stated, that the applications are developed neatly, concisely, and with a minimum of effort. In this respect the book is excellent. However, unless the reader is already familiar with the basic principles of dynamics, fluid mechanics, and electrodynamics, he will be unable to appreciate the organizational structure of the book which leads so naturally to a clear elucidation of these fundamental applications.

Chapter 9 is divorced from the remainder of the book. In this chapter the author axiomatically defines what is meant by a vector space over a field and discusses some of the elementary properties of vector spaces. Since this algebraic concept enters into most branches of modern applied mathematics it is gratifying to find even a brief introduction to this subject in a book dealing with what is usually referred to as a classical discipline.

The book is excellently provided with illustrative examples and problems. The examples complement the text and range from an elegant formulation of Desargues' Theorem, Ceva's Theorem, and Pascal's Theorem in Chapter 1, to a discussion of the magnetostatics of certain geometrical configurations in Chapter 8. Each chapter is provided with several short sets of problems, and answers to the problems are listed in the back of the book.

This reviewer found several points in the exposition which could be subject to criticism. Some of these are cited below together with a few of the more glaring typographical errors:

1. As noted in the index, the definition of the term "basis" occurs on p. 37; however, the term is first used on p. 31.
2. In Chapter 1 the symbol $(\vec{u}, u_0)$ denotes a straight line. In Chapter 2 the same symbol denotes a line vector.
3. The term "cycl" first appears in a hint in Problem 17, §11, Chapter 1, but this term is never explained. It also occurs later in the text with no explanation.
4. The term "weighted centroid" is used in §7 of Chapter 1 without being previously defined. It may not be clear how this term differs from a centroid.
5. If P is a dyadic, it is never explicitly stated what is meant by the product $\vec{u} \cdot P$, although some vague hints are given.
6. Although the term "double layer" is defined, the term "single-layer" is used in §82, Chapter 8, without being previously defined.
7. In §97, Chapter 9, the author promises to prove that $U + V$ is a vector in Hilbert space, when U and V are elements of Hilbert space. He never does so explicitly, although the machinery is developed.
8. In Figure 2a, the letter "D" is missing.
9. In §67, Chapter 7, equation (53.3) should read "W_1" instead of "W".
10. In §88, Chapter 9, property A_4 is incorrectly stated.
11. There is a confusion in subscripts in the statement of Theorem 1, §97, Chapter 9.

In conclusion, the organization of the book, with the possible exception of the superfluous Chapter 2, is so outstanding that it far outweighs any of the minor flaws cited above. The book is strongly recommended.

Thermodynamics: An Advanced Treatment for Chemists and Physicists (3rd Revised Edition). By E. A. Guggenheim. 476 pp. (North-Holland, Holland) Interscience Publishers, Inc., New York, 1957. $9.75. *Reviewed by Harold W. Woolley, National Bureau of Standards.*

In its third edition, this valuable reference book and text has been improved further by several changes. The treatment of mixtures has been made more unified and the topics covered have been extended into the field of the thermodynamics of irreversible processes. The author of this book does not claim completeness of coverage of all topics touched on. Instead, there has been judicious choice of items of principal interest to both chemists and physicists in the broad field comprising physical chemistry.

In a presentation emphasizing the logical application of fundamental principles, there may be less emphasis on the spirit of adventure than some experimentalists feel necessary to be consistent with the original development of the science. Professor Guggenheim has given references to many of his original scientific contributions, however, to which one may turn for examples of such developments. Though it may appear to some experimentalists that this is primarily a theorists' book, there are actually numerous examples of quotation of experimental data and comparison with theoretical indications. This reviewer considers it quite proper that the subject of thermodynamics be presented as a mathematically exact discipline and considers it appropriate to possess a copy of so excellent a book prepared on this basis.

Vector Spaces and Matrices. By Robert M. Thrall and Leonard Tornheim. 318 pp. John Wiley & Sons, Inc., New York, 1957. $6.75. *Reviewed by T. Teichmann, Lockheed Missile Systems Division.*

Vectors and matrices have become an almost indispensable tool in modern applied mathematics and physics. Parallel with this interest in applications there has been a revival in pure mathematical activity concerned with linear algebra and vector spaces, stimulated at least to some degree by the applications. In the usual way, however, the abstract and applied approaches have gradually diverged so that it may often be perplexing for the user of these methods to gather information from a pure mathematical book on these topics.